

I Claim:

1. A system for testing an electronic module having a plurality of terminal contacts comprising:

5 a test circuitry configured to generate and apply test signals to the module;

an interface board comprising a plurality of contact pads in electrical communication with the test circuitry; and

10 a plurality of test contactors on the interface board configured to simultaneously electrically engage the terminal contacts on the component and the contact pads on the interface board to establish electrical communication there between with a zero insertion force on the module.

15 2. The system of claim 1 wherein the test contactors comprise rotatable spring contacts comprising first leaf spring portions configured to electrically engage the contact pads and second leaf spring portions configured to electrically engage the terminal contacts.

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3. The system of claim 1 wherein the test contactors comprise a base rotatably mounted to the test board.

25 4. The system of claim 1 wherein the test contactors comprise slidable beam contacts comprising first portions configured to electrically engage the contact pads and second portions configured to electrically engage the terminal contacts.

30 5. The system of claim 1 further comprising an actuator mechanism attached to the test contactors and configured to move the test contactors from a first position in which the terminal contacts are not engaged, to a second position in which the terminal contact are electrically engaged.

6. A system for testing an electronic module having a plurality of terminal contacts comprising:

a test circuitry configured to generate and apply test
5 signals to the module;

an interface board comprising a plurality of contact pads in electrical communication with the test circuitry; and

a plurality of spring contacts rotatably mounted to the interface board configured to establish electrical
10 communication between the terminal contacts and the test circuitry, each spring contact comprising a first portion configured to electrically engage a contact pad on the interface board, and a second portion configured to electrically engage a terminal contact on the module with a
15 zero insertion force on the module.

7. The system of claim 6 wherein the spring contacts comprise metal pins embedded in a rotatable base.

20 8. The system of claim 6 wherein the first portion comprises a first leaf spring segment and the second portion comprises a leaf second spring segment.

9. The system of claim 6 wherein the interface board
25 comprises a pair of supports and the spring contacts comprise a base rotatably mounted to the supports.

10. The system of claim 6 wherein the terminal contacts
30 comprise planar pads.

11. The system of claim 6 wherein the module comprises an element selected from the group consisting of semiconductor memory modules, multi chip modules,

semiconductor carriers, semiconductor packages, and microprocessors.

12. A pass through system for testing an electronic
5 module having a plurality of terminal contacts comprising:

a test circuitry configured to generate and apply test signals to the module;

an interface board comprising a plurality of contact pads in electrical communication with the test circuitry; and

10 a plurality of beam contacts slidably mounted to the interface board configured to establish electrical communication between the terminal contacts and the test circuitry, each beam contact comprising a first portion configured to electrically engage a contact pad on the
15 interface board, and a second portion configured to electrically engage a terminal contact on the module with a zero insertion force on the module.

13. The system of claim 12 wherein the beam contacts
20 comprise metal pins embedded in a slidable base and mounted at an angle with respect to the contact pads and the terminal contacts.

14. The system of claim 12 wherein the first portion
25 comprises a first end and the second portion comprises a second end.

15. The system of claim 12 wherein the interface board
30 comprises a pair of supports and the beam contacts comprise a base slidably mounted to the supports.

16. The system of claim 12 wherein the terminal contacts comprise planar pads.

17. The system of claim 12 wherein the module comprises an element selected from the group consisting of semiconductor memory modules, multi chip modules, semiconductor carriers, semiconductor packages, and microprocessors.

18. A pass through system for testing an electronic module having a plurality of terminal contacts comprising:

a test circuitry configured to generate and apply test signals to the module;

an interface board comprising a plurality of contact pads in electrical communication with the test circuitry;

a base movably mounted to the interface board;

a plurality of contacts on the base movable with the base from a first position to a second position, each contact comprising a first portion configured to electrically engage a contact pad on the interface board in the second position, and a second portion configured to penetrate a terminal contact on the module in the second position with a zero insertion force on the module.

19. The system of claim 18 wherein the base comprises a rotatable element and the contacts comprise springs configured to scrub the terminal contacts in the second position.

20. The system of claim 18 wherein the base comprises a slidable element and the contacts comprise angled beams configured to penetrate the terminal contacts in the second position.

21. A pass through system for testing an electronic module having a plurality of terminal contacts comprising:

a test circuitry configured to generate and apply test signals to the module;

an interface board;

a plurality of test contactors on the interface board
5 configured to electrically engage the terminal contacts and movable from a first position to a second position, each test contactor comprising a coiled spring and a terminal portion configured to penetrate a terminal contact with a spring force generated by the coiled spring; and

10 a flex circuit in electrical communication with the test contactors and the test circuitry.

22. The system of claim 21 wherein the test contactors comprise a base slidably mounted to the interface board.

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23. The system of claim 21 wherein the test contactors comprise a molded plastic base slidably mounted to the interface board and the coiled springs are embedded in the molded plastic.

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24. The system of claim 21 wherein the module comprises an element selected from the group consisting of semiconductor memory modules, multi chip modules, semiconductor carriers, semiconductor packages, and
25 microprocessors.

25. A method for testing an electronic module having a plurality of terminal contacts comprising:

30 providing an interface board comprising a plurality of contact pads in electrical communication with test circuitry;

providing a plurality of movable test contactors on the interface board comprising a plurality of spring contacts configured to electrically engage the terminal contacts and the contact pads;

placing the module on the interface board with a zero insertion force and the terminal contacts proximate to the test contactors;

moving the test contactors to physically and
5 electrically engage the terminal contacts and the contact pads with the spring contacts; and

applying test signals through the test contactors and the terminal contacts to the module.

10 26. The method of claim 25 wherein the spring contacts comprise leaf springs.

27. The method of claim 25 wherein the spring contacts
comprise first leaf springs configured to electrically engage
15 the terminal contacts and second leaf springs configured to electrically engage the contact pads.

28. The method of claim 25 wherein the spring contacts
comprise beam leads.

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29. The method of claim 25 wherein the spring contacts
comprise coil segments.

30. A method for testing an electronic module having a
25 plurality of terminal contacts comprising:

providing a test circuitry configured to generate and
apply test signals to the module;

providing an interface board;

providing a plurality of movable test contactors on the
30 interface board comprising a plurality of coiled spring
contacts configured to electrically engage the terminal
contacts and the contact pads, and a flex circuit in
electrical communication with the spring contacts and the
test circuitry;

placing the module on the interface board with a zero insertion force with the terminal contacts proximate to the test contactors;

moving the test contactors to physically and
5 electrically engage the terminal contacts with the coiled spring contacts; and

applying test signals through the test contactors and the terminal contacts to the module.

10 31. The method of claim 30 wherein the test contactors are slidably or rotatably mounted to the interface board.

32. The method of claim 30 wherein the spring contacts generate a force for electrically engaging the terminal
15 contacts.

33. A method for testing an electronic module having a plurality of terminal contacts comprising:

providing a test circuitry configured to generate and
20 apply test signals to the module;

providing an interface board comprising a plurality of contact pads in electrical communication with the test circuitry;

providing a plurality of test contactors on the
25 interface board comprising a movable base and a plurality of spring contacts on the base configured for movement from a first position to a second position;

placing the module on the interface board with the terminal contacts aligned with the test contactors with a
30 zero insertion force;

rotating the spring contacts to electrically engage the terminal contacts and the contact pads; and

applying test signals through the spring contacts and the terminal contacts to the module.

34. The method of claim 33 wherein the spring contacts comprise rotatable leaf springs..

5 35. The method of claim 33 wherein the spring contacts comprise first leaf spring portions configured to electrically engage the terminal contacts and second leaf spring portions configured to electrically engage the contact pads.

10 36. The method of claim 33 wherein the spring contacts comprise slidable beam leads.

15 37. The method of claim 33 wherein the spring contacts are configured to generate a spring force for electrically engaging the terminal contacts.

20 38. The method of claim 33 wherein the terminal contacts comprise planar pads.

25 39. The method of claim 33 wherein the module comprises an element selected from the group consisting of semiconductor memory modules, multi chip modules, semiconductor carriers, semiconductor packages, and microprocessors.

40. A pass through test contactor for testing an electronic module having a plurality of terminal contacts comprising:

30 a plurality of movable spring contacts configured to establish temporary electrical connections with the terminal contacts with a zero insertion force, each spring contact comprising a first portion configured to electrically engage

a contact pad on a board, and a second portion configured to electrically engage a terminal contact on the module.

41. The test contactor of claim 40 wherein the spring
5 contacts comprise rotatable leaf springs.

42. The test contactor of claim 40 wherein the spring contacts comprise slidable beam leads.

10 43. In a pass through test system including test circuitry for applying test signals to an electronic module, a test contactor for establishing electrical communication between the test circuitry and the module comprising:

an interface board comprising a first contact in
15 electrical communication with the test circuitry;

a base movably mounted to the interface board from a first position to a second position; and

a contact on the base comprising a first portion configured to electrically engage the first contact, and a
20 second portion configured to penetrate a second contact on the module with a zero insertion force on the module upon movement of the base from the first position to the second position.

25 44. The test contactor of claim 43 wherein the base comprises plastic and the contact comprises a metal pin embedded in the plastic.

45. The test contactor of claim 43 wherein the base
30 comprises a rotatable member and the first portion is configured to scrub across the second contact.

46. The test contactor of claim 43 wherein the base comprises a slidable member and the first portion is configured to penetrate the second contact.

5 47. A pass through test contactor for testing an electronic module having a plurality of terminal contacts comprising:

 a base movable from a first position to a second position;

10 a plurality of spring contacts on the base configured to electrically engage the terminal contacts and movable from the first position to the second position, each test contactor comprising a coiled spring and a terminal portion configured to penetrate a terminal contact with a spring
15 force generated by the coiled spring and with a zero insertion force on the module; and

 a flex circuit in electrical communication with the spring contacts.

20 48. The test contactor of claim 47 wherein the base comprises molded plastic and the coiled springs are embedded in the molded plastic.

 49. The test contactor of claim 47 wherein the module
25 comprises an element selected from the group consisting of semiconductor memory modules, multi chip modules, semiconductor carriers, semiconductor packages, and microprocessors.

30 50. The test contactor of claim 47 further comprising an interface board comprising support members for movable mounting the base.